



Overview

Points To Remember About Osteoporosis

- Osteoporosis is a disease in which the bones become weak and are more likely to break.
- Osteoporosis is called the "silent disease" because bone loss does not have any symptoms until a bone breaks.
- Certain risk factors can cause bone loss and osteoporosis.
- Doctors use a bone mineral density test to check your bone health.
- Osteoporosis is treated with diet, exercise, lifestyle changes, and medicines.
- To help keep bones strong and slow down bone loss, eat a diet rich in calcium and vitamin D; exercise; and keep a healthy lifestyle.
- Take steps to prevent falls both inside and outside.

Osteoporosis is a disease in which bones are weak and have a higher chance to break. Bone strength has two main features:

- Bone mass or amount of bone.
- Bone quality.

You may think that osteoporosis is a natural and unavoidable part of aging. However, medical experts now believe that osteoporosis is largely preventable. Furthermore, if you already have osteoporosis, you can take steps to prevent or slow further progress of the disease and reduce your risk of future fractures. Although osteoporosis was once viewed as a disease of old age, it is now recognized as a disease that can stem from less than optimal bone growth during childhood and adolescence, as well as from bone loss later in life.

In addition to the financial costs, osteoporosis takes a toll in terms of reduced quality of life for many people who suffer fractures. It can also affect the lives of your family members and friends who serve as your caregivers.

Osteoporosis is the major underlying cause of fractures in postmenopausal women and the elderly. Fractures can occur in any bone, but happen most often in bones of the:

- Hip.
- Spine.
- Wrist.

Of all fractures, hip fractures have the most serious impact. Most hip fractures require hospitalization and surgery; some hip fracture patients require nursing home placement. Vertebral fractures also can have serious consequences, including chronic back pain and disability. They have also been linked to increased mortality in older people.

Idiopathic juvenile osteoporosis

Some children and adolescents develop osteoporosis that has no known cause, known as idiopathic juvenile osteoporosis (IJO). Young people who have this rare form of osteoporosis usually recover within 2 to 4 years. The basic treatment strategy may include:

- Protecting the spine and other bones from fracture until recovery occurs.
- Recommending calcium and vitamin D supplements
- Prescribing certain medications used to treat adults with osteoporosis, especially in severe cases.

Symptoms

Osteoporosis is often called a “silent disease” because it usually progresses without any symptoms until a fracture occurs or one or more vertebrae (bones in the spine) collapse. Collapsed vertebrae may first be felt or seen when a person develops severe back pain, loss of height, or spine malformations such as a stooped or hunched posture. Bones affected by osteoporosis may become so fragile that fractures occur spontaneously or as the result of:

- Minor bumps.
- Falls.
- Normal stresses and strains such as bending, lifting, or even coughing.

Causes

Osteoporosis affects women and men of all races and ethnic groups. Osteoporosis can strike at any age, although the risk for developing the disease increases as you get older. Osteoporosis:

- Is most common in non-Hispanic white women and Asian women.
- African American and Hispanic women have a lower risk of developing osteoporosis, but they are still at significant risk.
- For Native American women, the data isn't clear.
- Among men, osteoporosis is more common in non-Hispanic whites and Asians than in men of other ethnic or racial groups.

Factors that are linked to the development of osteoporosis or contribute to an individual's likelihood of developing the disease are called risk factors. Many people with osteoporosis have several risk factors for the disease, but others who develop osteoporosis have no identified risk factors. There are some risk factors that you cannot change, and others that you can or may be able to change.

Risk factors you can or may be able to change:

- **Hormone changes.** Low levels of estrogen from amenorrhea, the abnormal absence of menstrual periods, is the most common reason premenopausal women have changes in estrogen levels. Missed or irregular periods can be caused by various factors, including:
 - Hormonal disorders.
 - Extreme levels of physical activity combined with restricted calorie intake. For example, in female marathon runners, ballet dancers, and women who spend a great deal of time and energy working out at the gym.

Low estrogen levels in women after menopause and low testosterone levels in men also increase the risk of osteoporosis. Lower than normal estrogen levels in men may also play a role. Low testosterone and estrogen levels are often a cause of osteoporosis in men being treated with certain medications for prostate cancer.

- **Diet.** From childhood into old age, a diet low in calcium and vitamin D can increase your risk of osteoporosis and fractures. Excessive dieting or inadequate caloric intake can also be bad for bone health. People who are very thin and do not have much body fat to cushion falls have an increased risk of fracture.
- **Certain medical conditions.** In addition to sex hormone problems and eating disorders, other medical conditions can increase the risk of osteoporosis, including:
 - Genetic disorders.
 - Endocrine diseases.
 - Gastrointestinal diseases and conditions.
 - Blood diseases.
 - Rheumatic disorders.
 - Anorexia nervosa.
 - Late onset of puberty and early menopause.
- **Medications.** Long-term use of certain medications linked with osteoporosis include:
 - Anticoagulants (heparin).
 - Anticonvulsants (some).

- Aromatase inhibitors.
- Cyclosporine A and tacrolimus.
- Cancer chemotherapy drugs.
- Glucocorticoids (and adrenocorticotrophic hormone [ACTH]).
- Gonadotropin-releasing hormone agonists.
- Lithium.
- Methotrexate.
- Proton pump inhibitors.
- Selective serotonin reuptake inhibitors (SSRIs).
- Thyroxine.

(The above is not an inclusive list)

- **An inactive lifestyle or extended bed rest.** Low levels of physical activity and prolonged periods of inactivity can contribute to an increased rate of bone loss. They also leave you in poor physical condition, which can increase your risk of falling and breaking a bone.
- **Excessive use of alcohol.** Chronic heavy drinking is a significant risk factor for osteoporosis.
- **Smoking.** Most studies indicate that smoking is a risk factor for osteoporosis and fracture, although the exact reasons for the harmful effects of tobacco use on bone health are unclear.

Risk factors you cannot change:

- **Sex.** Your chances of developing osteoporosis are greater if you are a woman. Women have lower peak bone mass and smaller bones than men. They also lose bone more rapidly than men in middle age because of the dramatic reduction in estrogen levels that occurs with menopause.
- **Age.** The older you are, the greater your risk of osteoporosis. Bone loss builds up over time, and your bones become weaker as you age.
- **Body size.** Slender, thin-boned women are at greater risk, as are, surprisingly, taller women.
- **Race.** Caucasian (white) and Asian women are at highest risk. African American and Hispanic women have a lower but significant risk. Among men, Caucasians are at higher risk than others. These differences in risk can be explained in part, although not entirely, by differences in peak bone mass among these groups.
- **Family history.** Susceptibility to osteoporosis and fractures appears to be, in part, hereditary. People whose parents have a history of fractures also tend to have reduced bone mass and an increased risk for fractures.

You may have a higher risk for a hip fracture, independent of your bone density, if you have:

- An existing spine fracture.
- A mother who fractured her hip all increase the risk of hip fracture.
- More risk factors.

Diagnosis

Diagnosing osteoporosis involves several steps, starting with a

- Physical exam and a careful medical history.
- General testing, such as blood test and x-rays.
- Bone mineral density testing.

Physical exam and medical History

When recording information about your medical history, your doctor will ask questions to find out whether you have risk factors for osteoporosis and fractures. The doctor may ask about:

- Any previous fractures.
- Your lifestyle (including diet, exercise habits, and whether you smoke).
- Current or past health problems and medications that could contribute to low bone mass and increased fracture risk.
- Your family history of osteoporosis and other diseases.
- For women, your menstrual history.

The doctor will also do a physical exam that should include checking for loss of height and changes in posture and may include checking your balance and gait (the way you walk).

General testing

If you have back pain or have experienced a loss in height or a change in posture, the doctor may request an x-ray of your spine to look for spinal fractures or malformations due to osteoporosis. However, x-rays cannot necessarily detect osteoporosis. The results of laboratory tests of blood and urine samples can help your doctor identify conditions that may be contributing to bone loss, such as hormonal problems or vitamin D deficiency. If the results of your physical exam, medical history, x-rays, or laboratory tests indicate that you may have osteoporosis or that you have significant risk factors for the disease, your doctor may recommend a bone density test.

Bone mineral density (BMD) testing

Mineral is what gives hardness to bones, and the density of mineral in the bones is an important determinant of bone strength. BMD testing can be used to

- Definitively diagnose osteoporosis.
- Detect low bone mass before osteoporosis develops.
- Help predict your risk of future fractures.
- Monitor the effectiveness of ongoing therapy.

In general, the lower your bone density, the higher your risk for fracture. The results of a bone density test will help guide your doctor's decisions about starting therapy to prevent or treat

osteoporosis.

The most widely recognized test for measuring bone mineral density is a quick, painless, noninvasive technology known as central dual-energy x-ray absorptiometry (DXA). This technique, which uses low levels of x-rays, involves passing a scanner over your body while you are lying on a cushioned table. DXA can be used to determine BMD of the entire skeleton and at various sites that are prone to fracture, such as the hip, spine, or wrist. Bone density measurement by DXA at the hip and spine is generally considered the most reliable way to diagnose osteoporosis and predict fracture risk.

Your doctor will compare your BMD test results to the average bone density of young, healthy people and to the average bone density of other people of your age, sex, and race. If you are diagnosed with osteoporosis or very low bone density, or if your bone density is below a certain level and you have other risk factors for fractures, the doctor will talk with you about options for treatment or prevention of osteoporosis.

Treatment

The primary goal in treating people with osteoporosis is preventing fractures. A comprehensive treatment program includes:

- Proper nutrition.
- Lifestyle changes.
- Exercise.
- Prevention of falls that may result in fractures.
- Medications.
- Alternative therapies.

If you take medication to prevent or treat osteoporosis, it is still essential that you obtain the recommended amounts of calcium and vitamin D. Exercising and maintaining other aspects of a healthy lifestyle are also important.

For people with osteoporosis resulting from another condition, the best approach is to identify and treat the underlying cause. If you are taking a medication that causes bone loss, your doctor may be able to reduce the dose of that medication or switch you to another medication that is effective but not harmful to your bones. If you have a disease that requires long-term glucocorticoid therapy, such as rheumatoid arthritis or lupus, you can also take certain medications approved for the prevention or treatment of osteoporosis associated with aging or menopause.

Nutrition

A healthy, balanced diet that includes:

- Plenty of fruits and vegetables.
- Enough calories.

- Adequate calcium, vitamin D, and vitamin K is essential for minimizing bone loss and maintaining overall health. Calcium and vitamin D are especially important for bone health.

Calcium

Calcium is the most important nutrient for preventing osteoporosis and for reaching peak bone mass. For healthy postmenopausal women who are not consuming enough calcium (1,200 mg per day) in their diet, calcium and vitamin D supplements help to preserve bone mass and prevent hip fracture. Calcium is also needed for the proper function of

- The heart.
- Muscles.
- Nerves
- Blood clotting.

We take in calcium from our diet and lose it from the body mainly through urine, feces, and sweat. The body depends on dietary calcium to build healthy new bone and avoid excessive loss of calcium from bone to meet other needs. The Institute of Medicine of the National Academy of Sciences recommends specific amounts of dietary calcium and vitamin D for various stages of life. Men and women up to age 50 need 1,000 milligrams of calcium per day, and the recommendation increases to 1,200 milligrams for women after age 50 and for men after age 70.

Many people in the United States consume much less than the recommended amount of calcium in their diets. Good sources of calcium include

- Low-fat dairy products.
- Dark green leafy vegetables, such as bok choy, collards, and turnip greens.
- Broccoli.
- Sardines and salmon with bones.
- Soy beans, tofu, and other soy products.
- Calcium-fortified foods such as orange juice, cereals, and breads.

If you have trouble getting enough calcium in your diet, you may need to take a calcium supplement such as calcium carbonate, calcium phosphate, or calcium citrate. If you are between the ages of 19 and 50, your daily calcium intake should not exceed 2,500 milligrams because too much calcium can cause problems such as kidney stones. (After age 50, intakes should not exceed 2,000 milligrams per day.) Calcium coming from food sources provides better protection from kidney stones. Anyone who has had a kidney stone should increase their dietary calcium and decrease the amount from supplements as well as increase fluid intake.

Vitamin D

Vitamin D is required for proper absorption of calcium from the intestine. It is made in the skin after exposure to sunlight. Only a few foods naturally contain significant amounts of vitamin D, including fatty fish and fish oils. Foods fortified with vitamin D, such as milk and cereals, are a major dietary source of vitamin D. Although many people obtain enough vitamin D naturally, studies show that vitamin D production decreases in older adults, in people who are

housebound, and during the winter—especially in northern latitudes.

If you are at risk for vitamin D deficiency, you can take multivitamins or calcium supplements that contain vitamin D to meet the recommended daily intake of 600 International Units (IU) for men and women up to the age of 70 and 800 IU for people over 70. Doses of more than 2,000 IU per day are not advised unless under the supervision of a doctor. Larger doses can be given initially to people who are deficient as a way to replenish stores of vitamin D.

Recommended Calcium and Vitamin D Intakes

Life-stage group	Calcium mg/day	Vitamin D IU/day
Infants 0 to 6 months	200	400
Infants 6 to 12 months	260	400
1 to 3 years old	700	600
4 to 8 years old	1,000	600
9 to 13 years old	1,300	600
14 to 18 years old	1,300	600
19 to 30 years old	1,000	600
31 to 50 years old	1,000	600
51 to 70 years old males	1,000	600
51 to 70 years old females	1,200	600
>70 years old	1,200	800
14 to 18 years old, pregnant/lactating	1,300	600
19 to 50 years old, pregnant/lactating	1,000	600

Definitions: mg = milligrams; IU = International Units

Source: Food and Nutrition Board, Institute of Medicine, National Academy of Sciences, 2010.

Lifestyle

In addition to a healthy diet, a healthy lifestyle is important for optimizing bone health. You should:

- Avoid smoking and second-hand smoke.
- Drink alcohol in moderation (no more than one drink per day is a good general guideline).
- Talk to your doctor about medications you are taking. Some prescription medications can cause bone loss or increase your risk of falling and breaking a bone.

Exercise

Exercise is an important part of an osteoporosis treatment program. The evidence suggests that the most beneficial physical activities for bone health include strength training or resistance training. Physical activity can:

- Build and maintain bone throughout adulthood.
- Help maintain or even modestly increase bone density in adulthood.
- Reduce your risk of falling by increasing muscle mass and strength and improving coordination and balance.
- Help older people improve function and delay loss of independence.

Although exercise is beneficial for people with osteoporosis, it should not put any sudden or excessive strain on your bones. If you have osteoporosis, you should avoid high-impact exercise. To help ensure against fractures, a physical therapist or rehabilitation medicine specialist can:

- Recommend specific exercises to strengthen and support your back.
- Teach you safe ways of moving and carrying out daily activities.
- Recommend an exercise program that is tailored to your circumstances.

Other trained exercise specialists, such as exercise physiologists, may also be able to help you develop a safe and effective exercise program.

Fall prevention

Fall prevention is a critical concern for men and women with osteoporosis. Falls increase your likelihood of fracturing a bone in the hip, wrist, spine, or other part of the skeleton. Fractures can affect your quality of life and lead to loss of independence and even premature death. A host of factors can contribute to your risk of falling.

Falls can be caused by:

- Impaired vision or balance.
- Loss of muscle mass.
- Chronic or short-term illnesses that impair your mental or physical functioning.
- Use of four or more prescription medications.
- Side effects of certain medications, such as
 - Sedatives or tranquilizer.
 - Sleeping pills.
 - Antidepressants.
 - Anticonvulsants.
 - Muscle relaxants.
 - Heart medicines.
 - Blood pressure pills.
 - Diuretics.
 - Drinking alcoholic beverages.

If you have osteoporosis, it is important to be aware of any physical changes you may be experiencing that affect your balance or gait and to discuss these changes with your doctor or other health care provider. It is also important to have regular checkups and tell your doctor if you have had problems with falling.

The force or impact of a fall (how hard you land) plays a major role in determining whether you will break a bone. Catching yourself so that you land on your hands or grabbing onto an object

as you fall can prevent a hip fracture. You may break your wrist or arm instead, but the consequences are not as serious as if you break your hip. Studies have shown that wearing a specially designed garment that contains hip padding may reduce hip fractures resulting from falls in frail, elderly people living in nursing homes or residential care facilities, but use of the garments by residents is often low.

Falls can also be caused by factors in your environment that create unsafe conditions. Some tips to help eliminate the environmental factors that lead to falls include:

Outdoors and away from home:

- Use a cane or walker for added stability.
- Wear shoes that give good support and have thin nonslip soles. Avoid wearing slippers and athletic shoes with deep treads.
- Walk on grass when sidewalks are slippery; in winter, sprinkle salt or kitty litter on slippery sidewalks.
- Be careful on highly polished floors that are slick and dangerous, especially when wet, and walk on plastic or carpet runners when possible.
- Stop at curbs and check their height before stepping up or down.

Indoors:

- Keep rooms free of clutter, especially on floors.
- Keep floor surfaces smooth but not slippery.
- Wear shoes that give good support and have thin nonslip soles. Avoid wearing slippers and athletic shoes with deep treads.
- Be sure carpets and area rugs have skid-proof backing or are tacked to the floor. Use double-stick tape to keep rugs from slipping.
- Be sure stairwells are well lit and that stairs have handrails.
- Install grab bars on bathroom walls near tub, shower, and toilet.
- Use a rubber bath mat or slip-proof seat in the shower or tub.
- Improve the lighting in your home. Use a nightlight or flashlight if you get up at night.
- Use step ladders that are stable and have a handrail.
- Install ceiling fixtures or lamps that can be turned on by a switch near the room's entrance.
- If you live alone (or spend large amounts of time alone), consider purchasing a cordless phone; you won't have to rush to answer the phone when it rings and you can call for help if you do fall.
- Consider having a personal emergency-response system; you can use it to call for help if you fall.

Medications

Your doctor may prescribe medications that have been shown to slow or stop bone loss or build new bone, increase bone density, and reduce fracture risk. The U.S. Food and Drug Administration (FDA) has approved several medications for prevention or treatment of osteoporosis, based on their ability to reduce fractures:

- **Bisphosphonates:** Several bisphosphonates are approved for the prevention or treatment of osteoporosis. These medications reduce the activity of cells that cause bone loss.
- **Parathyroid hormone:** A form of human parathyroid hormone (PTH) is approved for postmenopausal women and men with osteoporosis who are at high risk for having a fracture. Use of the drug for more than 2 years is not recommended.
- **RANK ligand (RANKL) inhibitor:** A RANK ligand (RANKL) inhibitor is approved for postmenopausal women with osteoporosis who are at high risk for fracture.
- **Estrogen agonists/antagonists:** An estrogen agonist/ antagonist (also called a selective estrogen receptor modulator or SERM) is approved for the prevention and treatment of osteoporosis in postmenopausal women. SERMs are not estrogens, but they have estrogen-like effects on some tissues and estrogen-blocking effects on other tissues.
- **Calcitonin:** Calcitonin is approved for the treatment of osteoporosis in women who are at least 5 years beyond menopause. Calcitonin is a hormone involved in calcium regulation and bone metabolism.
- **Estrogen and hormone therapy:** Estrogen and combined estrogen and progestin (hormone therapy) are approved for the prevention of postmenopausal osteoporosis as well as the treatment of moderate to severe hot flashes and vaginal dryness that may accompany menopause. Estrogen without an added progestin is recommended only for women who have had a hysterectomy (surgery to remove the uterus), because estrogen increases the risk of developing cancer of the uterine lining and progestin reduces that risk.

Results of the NIH-sponsored Women's Health Initiative, a large, long-term study of disease prevention strategies in postmenopausal women, suggest that, in most women, the harmful effects of long-term use of hormone therapy are likely to outweigh the disease prevention benefits.

The Food and Drug Administration has recommended that women use hormone therapy at the lowest dose and for the shortest time, and carefully consider and discuss with their doctor other approved osteoporosis treatments.

Alternative therapies

Isoflavones are naturally occurring compounds found in soybeans. Because they are structurally similar to estrogen, researchers have thought that they may hold promise as an alternative to estrogen therapy to protect postmenopausal women from osteoporosis. Several studies have explored the effects of soy isoflavones on bone health, but results have been mixed, ranging from a modest impact to no effect. Most of these studies had various limitations, including their short duration and small sample size, making it difficult to fully evaluate the impact of these compounds on bone health. Moreover, reports from NIH-supported clinical trials have failed to demonstrate a bone-sparing effect of soy isoflavones.

Who Treats

Medical specialists who treat osteoporosis include:

- Family physicians.

- Internists.
- Endocrinologists.
- Geriatricians.
- Gynecologists.
- Orthopaedic surgeons.
- Rheumatologists.
- Physiatrists (doctors specializing in physical medicine and rehabilitation).

Physical and occupational therapists and nurses may also participate in the care of people with osteoporosis.

Living With

Many of the things you do to prevent osteoporosis also help you to manage it. To help keep your bones strong and slow down bone loss, you can:

- Diet.
- Exercise.
- Healthy lifestyle.
- Preventing falls.

Diet

A healthy diet with enough calcium and vitamin D helps make your bones strong. Many people get less than half the calcium they need. Good sources of calcium are:

- Low-fat milk, yogurt, and cheese.
- Foods with added calcium such as orange juice, cereals, and breads.

Vitamin D is also needed for strong bones. You may need to take vitamin D pills. The chart on this page shows the amount of calcium and vitamin D you should get each day.

Recommended Calcium and Vitamin D Intakes

Life-stage group	Calcium mg/day	Vitamin D mcg/day
Infants 0 to 6 months	200	400
Infants 6 to 12 months	260	400
1 to 3 years old	700	600
4 to 8 years old	1,000	600
9 to 13 years old	1,300	600
14 to 18 years old	1,300	600
19 to 30 years old	1,000	600
31 to 50 years old	1,000	600

Life-stage group	Calcium mg/day	Vitamin D IU/day
51 to 70 years old males	1,000	600
51 to 70 years old females	1,200	600
>70 years old	1,200	800
14 to 18 years old, pregnant/lactating	1,300	600
19 to 50 years old, pregnant/lactating	1,000	600

Definitions: mg = milligrams; IU = International Units

Source: Food and Nutrition Board, Institute of Medicine, National Academy of Sciences, 2010.

Exercise

Exercise helps your bones grow stronger. The best exercises for healthy bones are strength building and weight bearing, such as:

- Walking.
- Hiking.
- Jogging.
- Climbing stairs.
- Lifting weights.
- Playing tennis.
- Dancing.

Healthy lifestyle

Smoking is bad for bones as well as the heart and lungs. Also, people who drink a lot of alcohol are more prone to bone loss and broken bones due to poor diet and risk of falling.

Preventing falls

Men and women with osteoporosis need to take care not to fall down. Falls can break bones. Some reasons people fall are:

- Poor vision.
- Poor balance.
- Certain diseases that affect how you walk.
- Some types of medicine, such as sleeping pills.

Some tips to help prevent falls outdoors are:

- Use a cane or walker.
- Wear rubber-soled shoes so you don't slip.
- Walk on grass when sidewalks are slippery.
- In winter, put salt or kitty litter on icy sidewalks.

Some ways to help prevent falls indoors are:

- Keep rooms free of clutter, especially on floors.
- Use plastic or carpet runners on slippery floors.
- Wear low-heeled shoes that provide good support.
- Do not walk in socks, stockings, or slippers.
- Be sure carpets and area rugs have skid-proof backs or are tacked to the floor.
- Be sure stairs are well lit and have rails on both sides.
- Put grab bars on bathroom walls near tub, shower, and toilet.
- Use a rubber bath mat in the shower or tub.
- Keep a flashlight next to your bed.
- Use a sturdy step stool with a handrail and wide steps.
- Add more lights in rooms.
- Keep a cordless phone to keep with you so that you don't have to rush to the phone when it rings and if you fall, you can call for help.

Aside from its effects on your bones, osteoporosis can change your life in many other ways. Osteoporosis affects each person differently and to different degrees. For example, people with a single fracture and those who have had multiple fractures do not face the same challenges. The particular site of a fracture (hip, spine, etc.) may also influence a person's life in different ways. The effects of osteoporosis on quality of life can include:

- Anxiety and depression.
- Reduced self-image.
- Limitations in the ability to work and enjoy leisure activities.
- Acute or chronic pain.
- Difficulties in performing the activities of daily life.
- Loss of independence.
- changes in relationships with family and friends.

Because osteoporosis has such wide-ranging effects, experts say that doctors and other health care providers should treat the whole person, not only the disease. Various measures are available to address the impact of osteoporosis on an individual's quality of life, including the emotional, physical, and functional effects of the disease as well as its social aspects. Some of these issues and how to address them are outlined below.

Emotional impacts of osteoporosis

- If you are nervous about the risk of breaking a bone when you go out to crowded places such as malls, movie theaters, or museums, try going at less crowded times. Take breaks and sit down when you feel tired.
- If you have been feeling symptoms of depression, such as loss of appetite, hopelessness, feeling useless and helpless, or having thoughts of suicide, for more than 2 weeks, consult a doctor, social worker, or therapist. Medications and counseling are available to fight depression.
- If you are feeling self-conscious about changes in your appearance, such as the curvature (kyphosis) that occurs in the upper spine after multiple vertebral fractures, look for styles

of clothing that minimize figure changes.

Functional and physical aspects of osteoporosis

- If you have trouble working, doing chores around the house, or other routine activities such as grocery shopping, try breaking them into short segments. Get up from sitting every half hour or so to ease muscle strain and reposition your skeleton. Also be aware of your posture, and avoid bending and twisting at the same time.
- Look for ways to modify sports and leisure activities that you enjoy to protect your bones, or cultivate new forms of physical activity that put less stress on your skeleton.
- If you experience pain after a fracture, try such pain-relief strategies as hot and cold compresses, biofeedback, and other relaxation strategies. Avoid long periods of inactivity or bed rest, which will worsen osteoporosis. Consult your health care professional about the use of analgesics such as acetaminophen.
- For chronic (long-term) back pain or tiredness caused by fractures in the spine, consult a physical therapist or rehabilitation specialist for exercises to strengthen the back muscles, which may minimize or relieve pain. You will need to continue these exercises faithfully to maintain their benefits.

Social aspects of osteoporosis

- Support groups, friends, and family members can help you manage the social challenges and limitations resulting from osteoporosis.
- Don't be afraid to ask others for help in dealing with the effects of osteoporosis on your life. For example, you may need to ask a family member, friend, or neighbor to help you bring groceries into your house or apartment. Find ways to give to others who help you so that you do not feel forced to choose between feeling that you are taking too much help and not taking any help at all.
- Remember that it is normal to want and need help from others as well as to help other people. You can work to keep relationships balanced so that no one does most of the taking over a long period of time, and keep in mind that we all help others throughout life. Friends and family are probably happy to help you, just as you feel good when you help others.
- Concern about experiencing or causing fractures can affect intimate relations between a husband and wife when one or both of you have osteoporosis. Although these topics can be difficult to discuss, couples can look for ways to achieve intimacy without increasing fracture risk. Most physical therapists have been trained to address this issue and can offer advice.

Prevention

Preventing osteoporosis is a lifelong endeavor. To reach optimal peak bone mass and minimize loss of bone as you get older, there are several factors you should consider. Addressing all of these factors is the best way to optimize bone health throughout life.

Screening for osteoporosis

Prevention also includes screening for osteoporosis. The U.S. Preventive Services Task Force, an independent panel of experts in primary care and prevention, recommends screening for osteoporosis for:

- All women age 65 and older be screened for osteoporosis.
- Women under the age of 65 who are at high risk for fractures.

You should also ask your doctor about osteoporosis if you:

- Are over 50 and have broken a bone.
- Have lost height or your posture has become stooped or hunched.
- Experience sudden back pain.
- Have a chronic disease or eating disorder known to increase the risk of osteoporosis.
- Are taking one or more medications known to cause bone loss.
- Have multiple risk factors for osteoporosis and osteoporosis-related fractures.

Consider talking to your doctor about being evaluated for osteoporosis if:

- You are a man or woman over age 50 or a postmenopausal woman and you break a bone.
- You are a woman age 65 or older.
- You are a woman younger than 65 and at high risk for fractures.
- You have lost height, developed a stooped or hunched posture, or experienced sudden back pain with no apparent cause.
- You have been taking glucocorticoid medications such as prednisone, cortisone, or dexamethasone for 2 months or longer or are taking other medications known to cause bone loss.
- You have a chronic illness or are taking a medication that is known to cause bone loss.
- You have anorexia nervosa or a history of this eating disorder.
- You are a premenopausal woman, not pregnant, and your menstrual periods have stopped, are irregular, or never started when you reached puberty.

Overall nutrition

A healthy, balanced diet that includes lots of fruits and vegetables and enough calories is also important for lifelong bone health. If you take in adequate amounts of calcium and vitamin D throughout your life, you are more likely to have optimal skeletal mass early in life and are less likely to lose bone later in life.

Calcium

Taking the recommended amount of calcium over a lifetime is thought to play an important role in the development of osteoporosis. Many published studies show that low calcium intakes are associated with

- Low bone mass.

- Rapid bone loss.
- High fracture rates.

National surveys suggest that the average calcium intake of individuals is far below the levels recommended for optimal bone health.

The body's demand for calcium is greater in:

- Childhood and adolescence, when the skeleton is growing rapidly.
- Women during pregnancy and breastfeeding.
- Postmenopausal women and older men. Increased calcium requirements in older people may be related to vitamin D deficiencies that reduce intestinal absorption of calcium.

Also, as you age, your body becomes less efficient at absorbing calcium and other nutrients. Older adults are also more likely to have chronic medical problems and to use medications that may impair calcium absorption.

Adolescence is the most critical period for building bone mass that helps protect against osteoporosis later in life. Yet studies show that among children age 9 to 19 in the United States, few meet the recommended levels. Therefore, it is especially important for parents, other caregivers, and pediatricians to talk to children and young teens about developing bone-healthy habits, including eating calcium-rich foods and getting enough exercise.

Vitamin D

Vitamin D plays an important role in calcium absorption and bone health. It is made in the skin after exposure to sunlight and can also be obtained through the diet. Although many people are able to obtain enough vitamin D naturally, vitamin D production decreases if you:

- Are older.
- Are housebound.
- Do not get enough sun.
- Have a chronic neurological or gastrointestinal diseases.

If you are at for vitamin D deficiency your doctor may recommend vitamin D supplements.

Calcium and vitamin D supplements may help slow bone loss and prevent hip fracture.

Recommended Calcium and Vitamin D Intakes

Life-stage group	Calcium mg/day	Vitamin D mcg/day
Infants 0 to 6 months	200	400
Infants 6 to 12 months	260	400
1 to 3 years old	700	600
4 to 8 years old	1,000	600
9 to 13 years old	1,300	600
14 to 18 years old	1,300	600

Life-stage group	Calcium mg/day	Vitamin D IU/day
19 to 30 years old	1,000	600
31 to 50 years old	1,000	600
51 to 70 years old males	1,000	600
51 to 70 years old females	1,200	600
>70 years old	1,200	800
14 to 18 years old, pregnant/lactating	1,300	600
19 to 50 years old, pregnant/lactating	1,000	600

Definitions: mg = milligrams; IU = International Units

Source: Food and Nutrition Board, Institute of Medicine, National Academy of Sciences, 2010.

Exercise

Like muscle, bone is living tissue that responds to exercise by becoming stronger. There is good evidence that physical activity early in life contributes to higher peak bone mass. The best exercise for building and maintaining bone mass is weight-bearing exercise: exercise that you do on your feet and that forces you to work against gravity. Weight-bearing exercises include:

- Jogging.
- Aerobics.
- Hiking.
- Walking.
- Stair climbing.
- Gardening.
- Weight training.
- Tennis.
- Dancing.

High-impact exercises may provide the most benefit. Bicycling and swimming are not weight-bearing exercises, but they have other health benefits. Exercise machines that provide some degree of weight-bearing exercise include:

- Treadmills.
- Stair-climbing machines.
- Ski machines.
- Exercise bicycles.

Strength training to build and maintain muscle mass and exercises that help with coordination and balance are also important. Later in life, the benefits of exercise for building and maintaining bone mass are not nearly as great, but staying active and doing weight-bearing exercise is still important.

A properly designed exercise program that builds muscles and improves balance and coordination provides other benefits for older people, including helping to prevent falls and maintaining overall health and independence. Experts recommend 30 minutes or more of

moderate physical activity on most (preferably all) days of the week, including a mix of weight-bearing exercises, strength training (two or three times a week), and balance training.

Smoking

Smoking is bad for your bones and for your heart and lungs. Women who smoke have lower levels of estrogen compared to nonsmokers and frequently go through menopause earlier.

Alcohol

People who drink heavily are more prone to bone loss and fractures because of poor nutrition and harmful effects on calcium balance and hormonal factors. Drinking too much also increases the risk of falling, which is likely to increase fracture risk.

Medications

The long-term use of glucocorticoids can lead to a loss of bone density and fractures. Other forms of drug therapy that can cause bone loss include:

- Long-term treatment with certain antiseizure drugs and barbiturates.
- Some drugs used to treat endometriosis.
- Excessive use of aluminum-containing antacids.
- Certain cancer treatments; and excessive thyroid hormone.

It is important to discuss the use of these drugs with your doctor, and not to stop or alter your medication dose on your own.

Research Progress

The NIAMS leads the Federal research effort on osteoporosis. Scientists at universities, medical centers, and other research institutions across the United States who are funded by NIAMS and other National Institutes of Health (NIH) components are pursuing a wide range of basic and clinical studies on the disease.

Significant advances in preventing and treating osteoporosis continue to be made. Such advances are the direct result of research focused on:

- Determining the causes and consequences of bone loss at the cellular and tissue levels.
- Assessing risk factors.
- Developing new strategies to maintain and even enhance bone density and reduce fracture risk.
- Exploring the roles of such factors as genetics, hormones, calcium, vitamin D, drugs, and exercise on bone mass.

Much of the research depends on the willingness of volunteers who take part in clinical trials. Clinical trials are research studies involving people that seek to answer specific scientific

questions to find better ways to prevent, detect, or treat diseases.

Some key areas of osteoporosis research supported by the NIAMS and its partners at the NIH are described below.

Genetic studies

Researchers are continuing to define genetic differences that underlie variation in bone formation, maintenance, and turnover. Applying the findings of genome-wide association studies to identify new molecular pathways related to bone health and disease may lead to new ways to prevent bone loss and fractures.

Bone cell biology

Scientists are exploring the biochemical pathways and cellular interactions that underlie the physiology of healthy, damaged, and diseased musculoskeletal tissues. Study of the cells that control bone remodeling continues to yield insights on the underlying causes of osteoporosis and points to possible new therapeutic targets.

Over the past several years, researchers have made considerable progress in understanding connections between bone physiology and the broader network of biologic processes involving many different organs and tissues. Scientists are working to explain the connection between the skeleton and the nervous system; other tissues such as fat, muscle, cartilage; the immune system; digestion and nutrition (including the role of the microbiome); and energy metabolism.

Study of osteoporotic fractures

The Study of Osteoporotic Fractures (SOF), which is supported by the NIAMS and the National Institute on Aging (NIA), is a multicenter study of 10,000 postmenopausal Caucasian women that has yielded comprehensive data about multiple risk factors for osteoporosis-related fractures. This study, which began in 1986, has provided the foundation for developing ways to identify people at greatest risk for osteoporosis and fractures decades in advance, and thus has greatly aided disease prevention efforts.

Osteoporosis in men

Osteoporosis in men has undergone major scrutiny in a multicenter study funded by the NIAMS in partnership with the NIA and the National Cancer Institute. The Osteoporosis in Men study (MrOS) enrolled 6,000 men age 65 years and older, and has identified significant risk factors for osteoporosis, falls, and fractures in men.

Evaluating and assessing bone quality

Scientists are exploring architectural and material factors that influence bone quality in hopes of gaining a better understanding of how properties of bone other than its mass or density affect bone strength. They are also developing new methods to assess bone quality and bone strength and predict fracture risk based on technologies such as ultrasound, computed tomography and magnetic resonance imaging.

Treatments for Osteoporosis

Researchers are examining the molecular and cellular mechanisms by which currently used osteoporosis drugs work, in the hope of advancing knowledge about their application to bone. In other studies, scientists are investigating novel approaches for preventing fractures associated with osteoporosis and related conditions.

Investigators are assessing the potential of combining therapeutic agents to achieve additive or synergistic treatment benefits in people with osteoporosis. As well, studies are comparing the effectiveness of different therapeutic approaches.

Prevention studies

Researchers continue to explore the impact of nutritional status on bone health and fracture risk. Scientists are examining the impact of physical activity levels on bone health and are developing and testing strategies to promote bone health through exercise and physical rehabilitation programs.

Researchers are also exploring effects of environmental factors, such as smoking and environmental toxins, on skeletal health.

Hope for the future

With ongoing research, experts hope that osteoporosis will come to be considered a curable disease. Research has enhanced our knowledge about how to maintain a healthy skeleton throughout life and has led to progress in understanding the causes, prevention, diagnosis, and treatment of osteoporosis. Every research advance brings us closer to eliminating the pain and suffering caused by this disease.

Related Resources

U.S. Food and Drug Administration

Toll free: 888-INFO-FDA (888-463-6332)

Website: <https://www.fda.gov>

[Drugs@FDA](https://www.accessdata.fda.gov/scripts/cder/daf) at <https://www.accessdata.fda.gov/scripts/cder/daf> [Drugs@FDA](https://www.accessdata.fda.gov/scripts/cder/daf) is a searchable catalog of FDA-approved drug products.

Centers for Disease Control and Prevention, National Center for Health Statistics

Website: <https://www.cdc.gov/nchs>

NIH Osteoporosis and Related Bone Diseases ~ National Resource Center

Website: <https://www.bones.nih.gov/>

National Institute on Aging

Website: <https://www.nia.nih.gov/>

American Academy of Orthopaedic Surgeons

Website: <https://www.aaos.org>

American Society for Bone and Mineral Research

Website: <https://www.asbmr.org/Default.aspx>

National Osteoporosis Foundation

Website: <https://www.nof.org/>

If you need more information about available resources in your language or other languages, please visit our webpages below or contact the NIAMS Information Clearinghouse at NIAMSInfo@mail.nih.gov.

- [Asian Language Health Information](#)
- [Spanish Language Health Information](#)

Join a Clinical Trial

[Find a Clinical Trial](#)

Related Information

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[Osteoporosis: Informe del Cirujano General sobre la salud de los huesos y la os...](#)

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[Osteoporosis and Arthritis: How Are They Different? Easy-to-Read Fast Facts](#)

[Asthma, What People With Asthma Need to Know About Osteoporosis](#)

[Bone Health and Osteoporosis: A Guide for Asian Women Aged 50 and Older](#)

[Osteoporosis and Arthritis: Two Common but Different Conditions](#)

[Osteoporosis and Arthritis and How Are They Different, What Are?](#)